

CLAIMS

1. A heat-sealing machine for heat-sealing an end part of a package containing a polymer battery module provided with a tab, said heat-sealing machine comprising a pair of sealing heads each provided with a sealing surface;

wherein the sealing surface of at least one of the sealing heads is provided with recess in a part thereof corresponding to the tab placed in the end part of the package.

2. The heat-sealing machine according to claim 1, wherein both the sealing surfaces of the sealing heads are provided with recesses.

3. The heat-sealing machine according to claim 2, wherein the recesses have a depth equal to about 1/3 of thickness of the tab.

4. The heat-sealing machine according to claim 2, wherein the recesses have a width in the range of  $w+0.2$  mm to  $w+2.0$  mm, where  $w$  is width of the tab.

5. The heat-sealing machine according to claim 1, wherein the package is formed from a laminated structure including, as essential components, a base layer, an adhesive layer, a first chemical conversion coating, a barrier layer, a second chemical conversion coating and an innermost layer.

6. The heat-sealing machine according to claim 5, wherein the innermost layer is a polyolefin resin film, and the innermost layer is bonded to the second chemical conversion coating by dry lamination.

7. The heat-sealing machine according to claim 5, wherein the laminated structure further includes an acid-modified polyolefin resin layer sandwiched between the second chemical conversion coating and the innermost layer, the innermost layer is formed of a polypropylene resin, and the acid-modified polyolefin layer and the innermost layer formed of the polypropylene resin are laminated by hot lamination at a process temperature not lower than the softening point of the acid-modified polyolefin resin.

8. The heat-sealing machine according to claim 5, wherein the laminated structure further includes an extruded resin

layer of an acid-modified polyolefin resin sandwiched between the second chemical conversion coating and the innermost layer, the innermost layer is a polyolefin resin film, the extruded resin layer and the innermost layer are laminated to the second chemical conversion coating by sandwich lamination, and the laminated structure is heated at a temperature not lower than softening point of the acid-modified polyolefin resin.

9. The heat-sealing machine according to claim 5, wherein the laminated structure further includes an extruded resin layer of an acid-modified polyolefin resin sandwiched between the second chemical conversion coating and the innermost layer, the innermost layer is formed of a polyolefin resin, the extruded resin layer and the innermost layer are laminated to the second chemical conversion coating by coextrusion, and the laminated structure is heated at a temperature not lower than softening point of the acid-modified polyolefin resin.

10. A heat-sealing method comprising the steps of:

putting a polymer battery module provided with a tab in a pouch package having one unsealed part through the unsealed part so that the tab is placed in the unsealed part of the pouch package; and

heat-sealing the unsealed part of the pouch package with a pair of sealing heads respectively having sealing surfaces, at least one of which being provided with a recess in a part corresponding to the tab.

11. A heat-sealing method comprising the steps of:

putting a polymer battery module provided with a tab in an embossed package; and

heat-sealing the embossed package with a pair of sealing heads respectively having sealing surfaces, at least one of which being provided with a recess in a part corresponding to the tab.

12. An embossing method of embossing a workpiece having a plurality of package sections by using an embossing machine provided with a male die part having male corrugated parts formed so as to correspond to boundary parts between the adjacent package sections of the workpiece, a male pressing part extending between the male corrugated parts and a male forming part placed in an

opening formed in the male pressing part, and a female die part having female corrugated parts corresponding to the male corrugated parts, and a female pressing part provided with a forming recess corresponding to the male forming part, said embossing method comprising the steps of:

forming cuts in a part of each of the package sections of the workpiece corresponding to the male pressing part and the female pressing part; and

forming an embossed hollow part in each package section of the workpiece by embossing the workpiece with the male and the female die part.

13. The embossing method according to claim 12, wherein the cuts are formed in the workpiece so that the cuts extends in a direction perpendicular to directions in which the workpiece is drawn during embossing.

14. The embossing method according to claim 12, wherein the cuts are formed in each package section after the package section has been placed between the male and the female die part.

15. The embossing method according to claim 12, wherein the cuts are formed in each package section before the package section is placed between the male and the female die part.

16. The embossing method according to claim 12, wherein the workpiece is a laminated structure including, as essential components, a base layer, an aluminum layer and an adhesive layer.

17. A workpiece comprising a plurality of package sections, which is to be embossed by an embossing machine provided with a male die part having male corrugated parts formed so as to correspond to boundary parts between the adjacent package sections of the workpiece, a male pressing part extending between the male corrugated parts and provided with an opening, and a male forming part placed in the opening formed in the male pressing part, and a female die part having female corrugated parts corresponding to the male corrugated parts, and a female pressing part extending between the female corrugated parts and provided

with a forming recess corresponding to the male forming part,  
further comprising cuts in parts of each package section  
to be placed between the male pressing part and the female pressing  
part.

18. The workpiece according to claim 17, wherein  
the workpiece is a laminated structure including, as  
essential components, a base layer, an aluminum layer and an  
adhesive layer.

19. A work pressing machine for pressing a part of a  
workpiece other than a part having an embossed hollow part formed  
by embossing of the workpiece, said workpiece pressing machine  
comprising:

a first die part provided with a recess for receiving the  
embossed part of the workpiece and disposed on one side of the  
workpiece, and

a second die part disposed on the other side of the  
workpiece to compress the workpiece between the first and the  
second die part;

wherein at least either the first or the second die part  
is heated.

20. The work pressing machine according to claim 19,  
wherein

both the first and the second die part are heated.

21. The work pressing machine according to claim 19,  
wherein

the workpiece is a laminated structure including, as  
essential components, a base layer, an aluminum layer and an  
adhesive layer.